REMARKS

Status of the Claims

Claims 1-11 are pending, with claims 1 and 8 being independent. Claims 1 and 8 have been amended and claim 11 has been added. Support for the amendments to claim 1 can be found throughout the specification as originally filed, for example, at page 7, lines 17-18; page 21, lines 12-14; and FIG. 10. Support for the amendments to claim 8 and for new claim 11 can be found throughout the specification as originally filed, for example, at page 7, lines 6-9; page 14, line 26 – page 15, line 11; and FIG. 4B. No new matter has been added.

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the foregoing amendments and following remarks.

Claim Interpretation

The Examiner asserts, "Merely labeling each of the N materials and the microgrid cells is not given patentable weight until such labeling is used for a specific purpose in order to solve a specific problem." (Office Action mailed October 6, 2006).

Claim 1 has been amended, *inter alia*, to delete "wherein whether voids and overlaps are present is calculated using a product of the unique identifiers" and to recite "calculating whether voids and overlaps are present using a product of the unique identifiers".

Claim Rejections Under 35 U.S.C. § 101

Claims 1-10 stand rejected under 35 U.S.C. § 101 because the claimed invention is allegedly directed to non-statutory subject matter. The Examiner asserts that the method claims do not produce a useful, tangible, and concrete result. Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

Claim 1 has been amended, *inter alia*, to recite step (k), "outputting the simulation", and claim 8 has been amended, *inter alia*, to recite "outputting a chart corresponding to the fluid materials in the cells with the product of the unique identifiers at overlapping cells present in the grid." Applicants respectfully submit that the amendments to claims 1 and 8 render this rejection under 35 U.S.C. § 101 moot.

Accordingly, withdrawal of the rejection under 35 U.S.C. § 101 is respectfully requested.

Claim Rejections Under 35 U.S.C. § 112

Claims 1-7 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 has been amended, *inter alia*, to delete "wherein whether voids and overlaps are present is calculated using a product of the unique identifiers" and to recite "calculating whether voids and overlaps are present using a product of the unique identifiers". Applicants respectfully submit that the amendments to claim 1 render this rejection under 35 U.S.C. § 112 moot.

Accordingly, withdrawal of the rejection under 35 U.S.C. § 112 is respectfully requested.

Claim Rejections Under 35 U.S.C. § 102

Claims 1 and 4 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Rudman's, "A volume-tracking method for incompressible multifluid flows with large density variations" ("Rudman"). Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

Rudman discloses a numerical technique (fine grid volume tracking or FGVT) for solving the time-dependent incompressible Navier-Stokes equations in fluid flows with large density variations for staggered grids. Mass conservation is based on a volume tracking method and incorporates a piecewise-linear interface reconstruction on a grid twice as fine as the velocity-pressure grid. It also uses a special flux-corrected transport algorithm for momentum advection, a multigrid algorithm for solving a pressure-correction equation and a surface tension algorithm that is robust and stable. In principle, the method conserves both mass and momentum exactly, and maintains extremely sharp fluid interfaces. (Summary).

Amended claim 1 recites a method for creating a simulation of flow of N materials and their interfaces in a computational domain comprising the steps of: (a) creating a macrogrid including control volumes on a computational domain in which N materials and their interfaces are to be tracked, wherein the number N of materials tracked is at least 2; (b) overlaying a microgrid including microgrid cells upon the macrogrid with each of the microgrid cells being coupled to a control volume; (c) initializing the macrogrid and control volumes with initial and boundary conditions; (d) assigning a unique identifier to each of the N materials and to the microgrid cells; (e) calculating volume fractions for the N-materials in the control volumes; (f) solving equations of motion upon the macrogrid and control volumes

utilizing the calculated volume fractions to arrive at local velocity conditions for the control volumes; (g) advecting the microgrid cells within the microgrid based on the calculated local velocity conditions in the control volumes such that voids and overlaps of the microgrid cells in the microgrid occur; (h) calculating whether voids and overlaps are present using a product of the unique identifiers; (i) reallocating the microgrid cells so that only one material is in each microgrid cell to effectively conserve mass and satisfy local fluid fraction gradient values; (j) repeating steps (e)-(i) until the simulation is complete; and (k) portraying the simulation.

Applicants respectfully submit that neither of claims 1 or 4 is anticipated by Rudman as each and every element as set forth in the claims is not found in Rudman. Specifically, Rudman does not disclose "assigning a unique identifier to each of the N materials and to the microgrid cells", "advecting the microgrid cells within the microgrid based on the calculated local velocity conditions in the control volumes such that voids and overlaps of the microgrid cells in the microgrid occur", or "*calculating whether voids and overlaps are present using a product of the unique identifiers*", as recited in claim 1. Claim 4 is ultimately dependent upon claim 1.

Accordingly, withdrawal of the rejection of claims 1 and 4 under 35 U.S.C. § 102(b) as allegedly anticipated by Rudman is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

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Claims 2 and 3 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Rudman, and further in view of Official Notice taken. Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

Claims 2 and 3 are dependent on claim 1. Accordingly, Applicants respectfully submit that claims 2 and 3 are patentable over Rudman for at least the reasons noted above in the discussion of the rejection of claims 1 and 4 under 35 U.S.C. § 102(b) as allegedly anticipated by Rudman. Applicants further note that the Examiner acknowledges that Rudman does not disclose that the unique identifiers are prime numbers or numbers generated by an Eulerian quadratic number generator.

Accordingly, withdrawal of the rejection of claims 2 and 3 under 35 U.S.C. § 103(a) as allegedly unpatentable over Rudman, and further in view of Official Notice taken, is respectfully requested.

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Claims 5-7 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Rudman, and further in view of Rider's "Reconstructing Volume Tracking" ("Rider"). Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

Rider is cited as disclosing: the number N of materials tracked is at least 3 , the number N of materials tracked is at least 4, and the interfaces between the N materials are tracked by the location of the microgrid cells containing different fluid materials.

Assuming arguendo that there is some suggestion or motivation to combine Rudman and Rider and a reasonable expectation of success in combining Rudman and Rider, Applicants respectfully submit that the proposed combination of Rudman and Rider still fails to establish a *prima facie* case of obviousness at least because Rider fails to cure the deficiencies of Rudman noted above in the discussion of the rejection of claims 1 and 4 under 35 U.S.C. § 102(b) as allegedly anticipated by Rudman.

Accordingly, withdrawal of the rejection of claims 5-7 under 35 U.S.C. § 103(a) as allegedly unpatentable over Rudman, and further in view of Rider, is respectfully requested.

Conclusion

In view of the foregoing amendments and remarks, reconsideration of the claims and allowance of the subject application is earnestly solicited.

Respectfully submitted,

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